

That which is claimed is:

1. A protein characterized as:

having a molecular weight of about 11,000,

having less than about 100 amino acid residues,

having one transmembrane domain,

having a relatively small intracellular domain,

having a relatively small extracellular domain,  
wherein said extracellular domain contains an amphipathic  
alpha helix motif, and

being relatively non-immunogenic,

wherein said protein is further characterized as lacking:

signal peptide, and

N-linked glycosylation signals.

2. A protein according to claim 1 having an amino  
acid sequence substantially the same as set forth in SEQ ID  
NO: 2 [ARV1], SEQ ID NO: 6 [ARV2] or SEQ ID NO: 8 [NBV].

3. A protein according to claim 1 having the amino  
acid sequence set forth in SEQ ID NO: 2 [ARV1], SEQ ID NO: 6  
[ARV2] or SEQ ID NO: 8 [NBV].

4. A protein characterized as:

having a molecular weight of about 15,000,

having less than about 150 amino acid residues,

having one transmembrane domain,

having one relatively small intracellular domain,

having a relatively small extracellular domain,  
wherein said extracellular domain contains an alpha helix  
motif, and

5 being relatively non-immunogenic,

wherein said protein is further characterized as lacking:

signal peptide, and

N-linked glycosylation signals.

5. A protein according to claim 4 having an amino  
10 acid sequence substantially the same as set forth in SEQ ID  
NO 10 [BRV].

6. A protein according to claim 4 having the amino  
acid sequence set forth in SEQ ID NO: 10 [BRV].

7. An antibody raised against the protein of claim 1.

15 8. An antibody raised against the protein of claim 4.

9. An isolated nucleic acid encoding protein  
according to claim 1.

10. An isolated nucleic acid according to claim 9  
having a contiguous nucleotide sequence substantially the  
20 same as:

nucleotides 25-1607 of SEQ ID NO: 1 [ARV1],

nucleotides 25-1607 of SEQ ID NO: 5 [ARV2],

nucleotides 27-1579 of SEQ ID NO: 7 [NBV], or

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a17  
variations thereof which encode the same amino acid sequence, but employ different codons for some of the amino acids, or splice variant nucleotide sequences thereof.

11. An isolated and purified nucleic acid, or  
5 functional fragment thereof encoding the protein of claim 1, selected from:

(a) DNA encoding the amino acid sequence set forth in SEQ ID NO: 2, SEQ ID NO: 6 or SEQ ID NO: 8, or

10 (b) DNA that hybridizes to the DNA of (a) under moderately stringent conditions, wherein said DNA encodes biologically active fusion protein, or

(c) DNA degenerate with respect to either (a) or (b) above, wherein said DNA encodes biologically active fusion protein.

15 12. An isolated nucleic acid according to claim 9 operatively associated with an inducible promoter.

13. An isolated nucleic acid encoding protein according to claim 4.

20 14. An isolated nucleic acid according to claim 13 having a contiguous nucleotide sequence substantially the same as:

nucleotides 25-832 of SEQ ID NO: 9 [BRV], or

variations thereof which encode the same amino acid sequence, but employ different codons for some of the  
25 amino acids, or splice variant nucleotide sequences thereof.

15. An isolated and purified nucleic acid, or functional fragment thereof encoding the protein of claim 4, selected from:

(a) DNA encoding the amino acid sequence set forth  
5 in SEQ ID NO: 10, or

(b) DNA that hybridizes to the DNA of (a) under moderately stringent conditions, wherein said DNA encodes biologically active fusion protein, or

(c) DNA degenerate with respect to either (a) or  
10 (b) above, wherein said DNA encodes biologically active fusion protein.

16. An isolated nucleic acid according to claim 13 operatively associated with an inducible promoter.

17. Cells containing protein according to claim 1.

15 18. Cells containing protein according to claim 4.

19. Cells containing nucleic acid according to claim 9.

20. Cells containing nucleic acid according to claim 12.

20 21. Cells containing nucleic acid according to claim 13.

22. Cells containing nucleic acid according to claim 16.

23. Liposomes containing protein according to claim 1.

25 24. Liposomes containing protein according to claim 4.

25. Liposomes containing nucleic acid according to claim 9.

26. Liposomes containing nucleic acid according to claim 13.

5 27. A method for the production of protein according to claim 1, said method comprising expressing nucleic acid encoding said protein in a suitable host.

10 28. A method for the production of protein according to claim 4, said method comprising expressing nucleic acid encoding said protein in a suitable host.

29. A method to promote membrane fusion, said method comprising contacting the membranes to be fused with an effective amount of a protein according to claim 1.

15 30. A method according to claim 29 wherein said membranes are cell membranes, liposome membranes or proteoliposome membranes.

31. A method to promote membrane fusion, said method comprising contacting the membranes to be fused with an effective amount of a protein according to claim 4.

20 32. A method according to claim 31 wherein said membranes are cell membranes, liposome membranes or proteoliposome membranes.

25 33. A method for the production of B cell or T cell hybridoma cells useful for the production of monoclonal antibodies, cytokines, immune modulators, or other heterokaryons, said method comprising contacting an immortalized myeloma cell and a primary B cell or T cell in the presence of a protein according to claim 1.

34. A method according to claim 33 wherein said immortalized cell is an human or mouse B cell myeloma cell or a T cell myeloma, wherein said antibody-synthesizing cell is a purified spleen cell from an immunized mammal.

5 35. A method for the production of hybridoma cells useful for the production of monoclonal antibodies, said method comprising contacting an immortalized cell and an antibody-synthesizing cell in the presence of a protein according to claim 4.

10 36. A method according to claim 35 wherein said immortalized cell is an human or mouse B cell myeloma cell or a T cell myeloma, wherein said antibody-synthesizing cell is a purified spleen cell from an immunized mammal.

15 37. A method for the production of liposome-liposome fusions or liposome-cell fusions, said method comprising contacting lipids suitable for the formation of liposomes and a suitable cell in the presence of a protein according to claim 1.

20 38. A method for the production of liposome-liposome fusions or liposome-cell fusions, said method comprising contacting lipids suitable for the formation of liposomes and a suitable cell in the presence of a protein according to claim 4.

25 39. In a method for the extracellular or intracellular delivery of bioactive compounds employing liposomes, the improvement comprising incorporating into said liposome a protein according to claim 1.

40. In a method for the extracellular or intracellular delivery of bioactive compounds employing liposomes, the

improvement comprising incorporating into said liposome a protein according to claim 4.

41. An isolated nucleic acid fragment useful as a hybridization probe, wherein said fragment comprises at least 14 contiguous nucleotides of the nucleic acid according to Claim 9, and wherein said fragment is labeled with a detectable substituent.

42. An isolated nucleic acid fragment useful as a hybridization probe, wherein said fragment comprises at least 14 contiguous nucleotides of the nucleic acid according to Claim 13, and wherein said fragment is labeled with a detectable substituent.

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